CLAIMS

1. An electrophoresis apparatus comprising:

a gel retaining layer;

one or two sample solution storage portions disposed on either side or both sides of said gel retaining layer;

two semi-permeable membranes disposed on the outer sides of said sample solution storage portions;

buffer solution storage portions disposed on the outer sides of said semi-permeable membranes;

a pair of electrodes disposed on the outer sides of said buffer solution storage portions; and

at least one liquid inlet/outlet respectively provided in each of the sample solution storage portions and the buffer solution storage portions.

2. An electrophoresis apparatus comprising:

a gel retaining layer;

one or two sample solution storage portions disposed on either side or both sides of said gel retaining layer;

two semi-permeable membranes disposed on the outer sides of said sample solution storage portions;

buffer solution storage portions disposed on the outer sides of said semi-permeable membranes; and

at least one liquid inlet/outlet respectively provided in each of the sample solution storage portions and the buffer solution storage portions, the liquid inlet/outlets

of the buffer solution storage portions also functioning as electrodes.

3. The electrophoresis apparatus according to claim 1 or 2, wherein a first supply mechanism is connected that feeds and/or drains the buffer solution to and/or from the buffer solution storage portions.

4. The electrophoresis apparatus according to claim 1 or 2, wherein a second supply mechanism is connected that feeds and/or drains the sample solution or the washing solution to and/or from the sample solution storage portions.

5. The electrophoresis apparatus according to claim 4, wherein a inlet/outlet that feeds or drains the sample solution or the washing solution is formed at the lowermost portion of the sample solution storage portions, and an air supply/exhaust port that feeds or drains the sample solution or the washing solution is formed at the uppermost portion of the sample solution storage portions.

6. The electrophoresis apparatus according to claim 1 or 2, wherein a feed port that feeds the buffer solution is formed at the lowermost portion of the sample solution storage portions, and a drain port that drains the buffer solution is formed at the uppermost portion of the sample solution storage portions.

7. The electrophoresis apparatus according to claim 1 or 2, wherein a temperature control mechanism is provided for heating or cooling to a specified temperature the buffer solution to be fed to the buffer solution storage portions.

8. The electrophoresis apparatus according to claim 1 or 2, wherein a buffer solution supply mechanism is provided for feeding buffer solutions that are different in terms of one or more of a concentration, a temperature, and a composition by switching between them to the buffer solution storage portions.

9. The electrophoresis apparatus according to claim 1 or 2, wherein a signal generator mechanism is provided for applying an arbitrary waveform and/or voltage on the electrodes according to a sequence and a time set beforehand.

10. The electrophoresis apparatus according to claim 1 or 2, wherein a buffer solution supply mechanism that feeds buffer solutions that are different in terms of one or more of a concentration, a temperature, and a composition by switching between them to the buffer solution storage portions; a signal generator mechanism that applies an arbitrary waveform and/or voltage on the electrodes according to a sequence and a time set beforehand; and a coordination control mechanism that coordinates the operation of the buffer solution supply mechanism and the signal generator mechanism are provided.

11. The electrophoresis apparatus according to claim 10, wherein a sample solution supply mechanism that feeds buffer solutions or washing solutions that are different in terms of one or more of a concentration, a temperature, and a composition by switching between them to the sample solution storage portions; and a coordination control mechanism that coordinates the operation of the buffer solution supply mechanism, the signal generator mechanism, and the sample solution supply mechanism are provided.

12. The electrophoresis apparatus according to claim 1 or 2, wherein the gel

retaining layer is a gel material held in one or more through-holes provided in a porous plate, a biological material being bound to this gel material.

13. The electrophoresis apparatus according to claim 12, wherein said biological material is DNA probes.

14. An electrophoresis method comprising the steps of:

feeding a sample solution or a washing solution to sample solution storage portions; and

applying a voltage across the pair of electrodes while feeding a buffer solution to a buffer solution storage portions using said electrophoresis apparatus, using the electrophoresis apparatus according to claim 1 or 2.

15. An electrophoresis method according to claim 14, wherein the sample solution or the washing solution is continuously or intermittently fed or drained to or from the sample solution storage portions.

16. An electrophoresis method according to claim 14, wherein the buffer solution is continuously or intermittently fed or drained to or from the buffer solution storage portions.

17. An electrophoresis method according to claim 14 comprising the steps of:

feeding the buffer solution from a liquid inlet/outlet at the lowermost portion of the buffer solution storage portions; and

draining the buffer solution from a liquid inlet/outlet at the uppermost portion of

the buffer solution storage portions.